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Analyzes of the Patients Admitted to an Academic Emergency Department with Acute Toxic Exposure

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Abstract

Background: The aim of the study was to report the pattern of patients with acute intoxication in an academic emergency department (ED).

Method: The study included 180 patients with acute intoxication who admitted to the Research Hospital of Yozgat Bozok University in Yozgat. Turkey between January 2018 and January 2019. The demographic features, arrival mode, intoxication type, intent status, requested consultations, and disposition forms were retrospectively evaluated based on the patient files.

Results: Acute toxic exposure was detected in a total of 180 patients during the study period. The male/female ratio was 0.68 (73/107). The median age was 26 ranging between 3 and 89. The most common acute toxic exposure presentations were due to drugs (57.2%, *n* = 103), venomous animal/insect bites (16.1%, *n* = 29) and toxic gas inhalation (13.9%, *n* = 25). Toxic gas inhalation included inhalations of carbon monoxide (11.7%, *n* = 21) and vapor of hydrochloric acid (2.2%, *n* = 4). The rest of the presentations (19.4%, *n* = 35) were due to food poisoning (7.8%, *n* = 14), alcohol intoxication (3.9%, *n* = 7) and ingested toxic agents (1.1%, *n* = 2). No illicit drug use was observed. Almost half of the toxic exposures (51.7%, *n* = 93) were considered as unintentional whereas 77.7% (*n* = 93) of drug intoxication cases were intentional suicidal attempts. At least one consultation was requested for 126 patients. Two or more consultations were performed for 19 patients. The most consulted division was Internal medicine (48.9%, *n* = 115). The most common drug intoxications were due to analgesics (24.3%, *n* = 25) and antidepressants (23.3%, *n* = 24).

Conclusion: Acute toxicity is not limited to drug poisoning. It is not a rare reason for ED admission with its many sub-headings.

Keywords: Intoxication; Poisoning; Overdose; Environmental; Drug.

Introduction

Acute toxic exposure can be described as being affected by a substance or substances adversely in a short period of time. The time period is usually less than 24 hours but can last up to 2 weeks.[1] The exposed agents are generally classified into chemical, biological, physical or radiation. The exposure route can be dermal, oral, parenteral or inhalation. Most of the acute toxicity studies in the literature focus on specific subgroups like drug, chemical or industrial exposures.

World Health Organization declared 5.4 deaths per 100.000 inhabitants in 2004.[2] Acute toxicity cases are mostly encountered in emergency departments (ED). The knowledge of ED physicians regarding the acute presentations of common toxic agents and mechanisms of action is critical to identify and meet

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the patient's initial and further treatment needs. The study was conducted to describe the pattern of the patients admitted to an academic emergency department with acute intoxication.

Materials and Methods

The study included all acute intoxication cases without any age limitation who admitted to the Research Hospital of Yozgat Bozok University in Yozgat, Turkey during a one-year period between January 2018 and January 2019. A total of 180 patients were treated for acute toxic exposure.

The demographic features, arrival mode, intoxication type, intention status, requested consultations, and disposition data were obtained from electronic patient files and were retrospectively evaluated. The ethical approval was obtained from the Ethical Committee of Yozgat Bozok University Medical Faculty.

The following intoxication types were included: ingested caustic and irritating agents, alcohol intoxications, biological intoxications due to food, plants or animals, toxic inhalations, radiation exposures and intoxications with medications. Ingested non-toxic foreign bodies (coins, plastics, or toys) or vaccination were excluded.

Analyses were done using SPSS version 25.0, At 95% CI, a p-value <0.05 was considered as significant. In statistical analysis, we used the chi-square test for comparing proportions. Means were compared by using the Mann–Whitney U test.

Results

Acute toxic exposure was detected in a total of 180 patients during the one-year study period. The study group represented 0.4% of all ED visits (180/41850). The study population included 73 males (40.6%) and 107 females (59.4%) with a male/female ratio of 0.68. The total number of pediatric and geriatric patients was 31 (17.2%). The median age was 26 ranging between 3 and 89 with a standard error of 1.3. The intentional exposures consisted of 48.3% of the study population. The most common admission season was autumn (34.4%) as represented in Table 1.

Table 1. Demographic data of the patients

Parameters	*n*	%
Sex		
Male	73	40.6
Female	107	59.4
Age groups		
18	18	10.0
18–65	149	82.8
65	13	7.2
Intention status		
Intentional	87	48.3
Unintentional	93	51.7
Admission season		
Spring (March–May)	33	18.3
Summer (June–August)	44	24.4
Autumn (September–November)	62	34.4
Winter (December–February)	41	22.8

The mean ages were 34 (SE = 2.2) and 24 (SE = 1.5) for males and females, respectively. The female patients were significantly younger than males, z = –3.678; p < 0.01. The intoxication with medication subgroup included 103 patients with 25 males (median age = 33) and 78 females (median age = 23), females being significantly younger than males z = –3.28. p < 0.01. The single/married ratio was 45/55%. Almost half of the patients (50.5%) arrived in the ED by ambulance. The ambulance service use was significantly higher in intentional group (p < 0.05) and the ambulatory arrivals were significantly higher in unintentional group (p < 0.05). The mean time between the incident and the admission to ED was 103 ± 93 minutes and was significantly lower in the intentional group (86 vs 129 min) (p < 0.01) (Table 2).

Table 2. The subanalysis of the patients with acute toxic exposure by the intention status

Total 180 patients	Intention status						*p*
	Intentional 87 (48.3%)			Unintentional 93 (51.7%)			
	Male	Female	Total	Male	Female	Total	
***n*, (%)**	**24**	**63**	**87**	**49**	**44**	**93**	
Age (years ± SE). 26	26.5 ± 2.1	23 ± 0.5	23 ± 0.7	25 ± 2.9	35.5 ± 3.2	39 ± .2.1	z (–5.37) $p < 0.01$
Marital status							
Single, $n = 81$ (45%)	11 (22.0%)	39 (78.0%)	50 (61.8%)	11 (35.5%)	20 (64.5%)	31 (38.2%)	
Married, $n = 99$ (55%)	13 (35.1%)	24 (64.9%)	37 (37.3%)	38 (61.3%)	24 (38.7%)	62 (62.7%)	
Admission type							
Ambulance, $n = 91$ (505%)	14 (21.9%)	50 (78.1%)	64 (70.3%)	15 (55.6%)	12 (44.4%)	27 (29.7%)	z (–3.68) $p < 0.05$
Ambulatory, $n = 89$ (49.5%)	10 (43.5%)	13 (56.5%)	23 (25.8%)	34 (51.5%)	32 (48.5%)	66 (74.2%)	z (-2.79) $p < 0.05$
Incident-Admission Time (Minutes), 103 ± 93 min	105 ± 90	79 ± 65	86 ± 73	163 ± 126	102 ± 92	129 ± 112	z (–2.60) $p < 0.05$

Almost half of the toxic exposures (51.7%, $n = 93$) were considered as unintentional whereas 77.7% ($n = 93$) of drug intoxication cases were intentional suicidal attempts. The most common acute toxic exposure presentations were due to drugs (57.2%, n =103). Venomous animal/insect bites (16.1%, n = 29) and toxic gas inhalation (13.9%, $n = 25$) (Fig. 1). Toxic gas inhalation included inhalation of carbon monoxide (CO) (11.7%, $n = 21$) and vapor of hydrochloric acid (HCl) (2.2%, $n = 4$). The rest of the presentations (19.4%, $n = 35$) were due to food poisoning (7.8%, $n = 14$), alcohol intoxication (3.9%, $n = 7$) and ingested toxic agents (1.1%, $n = 2$). No illicit drug use was observed. The most common drugs involved in intoxication with medications were analgesics (24.3%, n=25), antidepressants (23.3%, $n = 24$). benzodiazepines (12.6%, $n = 13$), salicylates (12.6%, $n = 13$) and neuroleptics (9.7%, $n = 10$), representing 82.5% of all intoxication with medications.

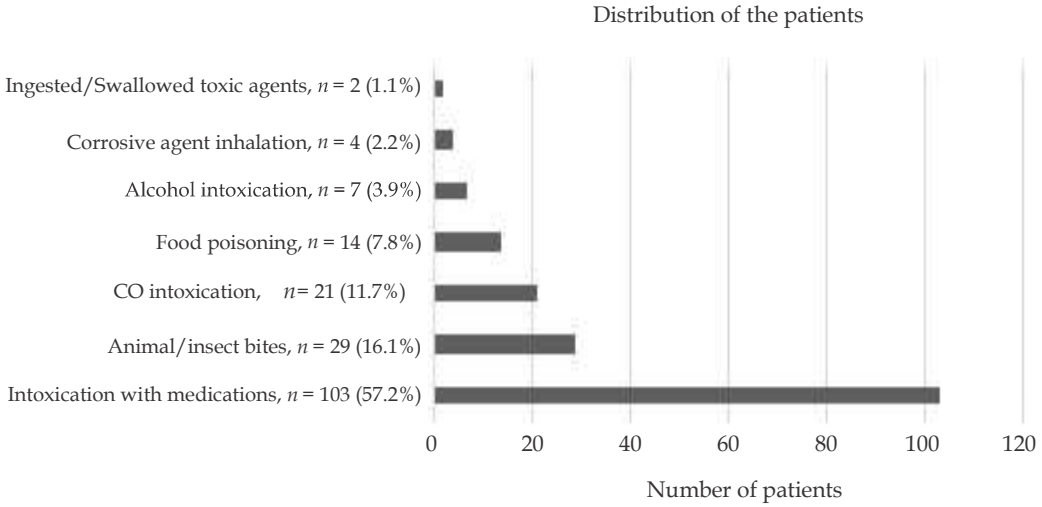

Fig. 1. The distribution of acute toxic exposure patients.

A positive history of depression was present in 88.5% of the intentional cases. The female subjects had a significantly higher rate of history of depression compared to male subjects ($p < 0.01$). There was a history of suicide attempt in 13 patients who had intentional exposures. There was no suicide attempt history in the group of unintentional cases.

More than one-third of total patients (35%) were discharged after the initial treatment from ED,

61.1% were hospitalized for further treatment and observation, and 2.8% were transferred to another medical center. No patient died during the study period due to acute toxic exposure. Only one patient left the ED without permission and medical advice (Table 3).

At least one consultation was requested for 126 patients. Two or more consultationswere performed for 19 patients. The most consulted division was Internal Medicine (48.9%, n = 115).

Table 3: Exposure type. history of depression. history of previous suicide attempt and disposition state of the patients by intention status

n (%)	Intention status						p
	Intentional 87 (48.3%)			Unintentional 93 (51.7%)			
	Male	Female	Total	Male	Female	Total	
	24	63	87	49	44	93	
Exposure type							
Intoxication with medications	17 (21.3%)	63 (78.8%)	80 (77.7%)	8 (34.8%)	15 (65.2%)	23 (22.3%)	
Alcohol intoxication	7 (100%)	0	7 (100%)	0	0	0	
Toxic inhalation	0	0	0	12 (48.0%)	13 (52.0%)	25 (100%)	
Food poisoning	0	0	0	8 (57.1%)	6 (42.9%)	14 (100%)	
Animal and insect bites	0	0	0	19 (65.5%)	10 (34.5%)	29 (100%)	
Positive history of Depression n = 26 (14.4%)	2 (8.7%)	21 (91.3%)	23 (88.5%)	2 (66.7%)	1 (33.3%)	3 (11.5%)	z (–4.41) p < 0.01
Positive history of Suicidal Attempt. n = 13 (7.2%)	3 (23.1%)	10 (76.9%)	13 (100%)	0	0	0	
Disposition status							
Discharge	7 (53.8%)	6 (46.2%)	13 (20.6%)	31(62.0%)	19 (38.0%)	50 (79.4%)	
Hospitalization	16 (23.2%)	53 (76.8%)	69 (62.7%)	17 (41.4%)	24 (58.6%)	41 (37.3%)	
Exitus	0	0	0	0	0	0	
Transfer	0	4 (100%)	4 (80.0%)	0	1 (100%)	1 (20.0%)	
Leave without permission	1 (100%)	0	1 (50.0%)	1 (100%)	0	1 (50.0%)	

Discussion

We foresee that a current and detailed profile of acute toxic exposure cases will play a role in the preparation, labor, and needs of the EDs. Acute toxic exposure has very broad subheadings, although even health care professionals focus on a narrow group "intentional drug poisoning" when acute toxicity termis on the table. Our study showed that 51.7% of the cases were unintentional. Unintentional acute toxic exposures are generally under diagnosed and/or under reported groups. The toxicity studies show low rates of intentional cases.[3,4] Therefore, this study can be seen as a comprehensive retrospective study including so many subgroups as possible.

ED admissions due to acute toxicities have an increasing trend worldwide.[5–7] The acute toxic exposure-related annual admissions represented 0.4% of all ED visits in our study which was close to the lower limits reported in the literature (0.39–7.8%).[5–10] As mentioned earlier, a variety of the acute toxicity ratios reported in the literature may stem from the number of the subgroups included in the studies, under-reporting of the cases, andthe included age range of patients.[7,10] It is obvious that the broader inclusion criteria are, the higher the epidemiologic rates would be got.

The second and third most common causes are generally differed but "intoxication with medication" is the leading cause of poisoning which is similar to the results of previous reports.[5,7,10,11] The median age was 26 (3–89) indicating that acute toxic exposure mainly an adolescence and adulthood problem. Intentional exposures constitute almost half of the study population (48.3%). They are mostly young female adults who abused pharmaceutical drugs—especially antidepressants—during

autumn. This common profile can be seen in many studies.[6,8,11,12] Another typical intoxication type with a seasonal pattern is CO intoxications. As expected, our cases mostly admitted to ED in the autumn and winter seasons.[13] In case of venomous insect bites, the expected seasons are generally spring and autumn.[8] Geographically speaking, the venomous insect/animal species living in Turkey are limited yet but we seasonally encounter tick bites and occasional snake, scorpion and spider bites in the clinical routine.[14]

Food poisoning was another common cause of intoxication in our patients (7.8%). The cases with food poisoning were all due to mushroom intoxication, which is compatible with toxicity literature in Turkey stating that mushroom intoxication is the most common reason of toxic liver failures both for adults and children in Turkey.[15]

A total of 35% of patients were discharged after the initial treatment from the ED, 61.1% were hospitalized for further treatment and observation, and 2.8% were transferred to another medical center. No patient died during the study period due to acute toxic exposure. The reported mortality rates can be up to 27% but it is generally associated with severely intoxicated ICU patients.[16] When this subpopulation is excluded, the mortality rate ranges from 0.24 to 9%.[17,18]

The pediatric and geriatric patients represent only a small part of the study population (10% and 7.2%, respectively). Despite the limitations in pediatric cases, most of them were young children with unintentional exposures and battery ingestions emerged as an important problem in pediatric groups, which were consistent with the literature.[13,19]

As suggested by the previous literature, some precautions should be taken to decrease acute toxic exposures such as increasing control of prescribed medications, psychological and/or psychiatric support in cases of depression and/or suicide attempts, promotion of public awareness via information campaigns especially among young population for intoxication with medication, effective protection of children from potentially harmful agents for pediatric toxic exposures, controlling of indoor heating systems for CO intoxications before winter use, and standardized personal protection during pesticide use.[11,20]

Being a descriptive study conducted at the ED of a university hospital located in a small town, our study is not free from some limitations. To begin with, our findings are likely to underestimate the current state due to the limited nature of the groups included in the study: our hospital does not have a pediatric ED so that we could not observe any drug exposures in children. As our city is a small, non-industrialized residential area in the central Anatolia where agriculture is not a prime way of living, we did not encounter any sea-origin, industrial, or agricultural (pesticide) intoxications. We excluded bee-sting and dog bite cases as parts of venomous animal/insect bites and detected no illicit drug abuse case during the study period. Moreover, we probably had an underreporting problem for acute toxic exposures, as well. To conclude, more representative studies conducted within broader range of time periods, based on national databases and of multi-centered nature are needed for more accurate data.

Conclusion

Current analysis of acute toxic exposures plays a key role in the regulation of EDs and the creation of holistic health care strategies. Although it appears to contain a small proportion of ED admissions, acute toxicity will always be an important medical topic due to its morbidity and mortality potential.

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